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PRESERVATION
OF
PHILIPPINE FOODS

BY

MARIA Y. OROSA

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By MARIA Y. OROSA

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PRESERVATION OF PHILIPPINE FOODS

By Maria Y. Orosa

Chief, Division of Food Preservation, Bureau of Science, Manila

INTRODUCTION

Although it has long been the practice among American and European housewives to preserve fruit, vegetables, and some meats and fish at home, to the majority of Philippine women food preservation is unknown. It is astonishing, indeed, and almost inexplicable that this valuable home industry has not received their attention when it is considered that consumption of preserved foods in the Islands is large and that there is available a great abundance of foods to preserve. Many Filipinos are fond of canned foods and those imported, such as peaches, grapes, lichees, asparagus, etc., are considered delicacies and are much in demand, in spite of their high cost. Canned salmon and sardines are consumed everywhere, particularly in places inland, where the supply of fresh fish is very limited. The importation of preserved foods amounts to several million pesos annually.

Fruits, vegetables, fish, and other fresh food materials abound in the Philippines. A large portion of these go to waste. In Calivo, Iloilo, and other places where pineapples are raised for the fiber, truckloads of the fruit are left in the fields to decay. In other places where transportation is still a problem, most of the fruits and vegetables unconsumed are left untouched.

Probably the reason why this important industry has been neglected is the great variety and abundance of fruits and vegetables raised in the Philippines, so that at least several kinds are in season all the year round; the most important reason, however, is the lack of knowledge how to preserve them. Because of the latter reason it is the object of this publication to explain in brief the general principles of food preservation and to advocate such preservation in the homes in order to utilize the fresh foods that now go to waste, and thus decrease the imports of preserved foods.

For the past three years the Bureau of Science has experimented in preserving native fruits and vegetables, both in cans and in glass jars, and the experiments have proved successful. From the time that its products were exhibited for the first time at the Carnival, in February, 1925, many inquiries have been received as to the process used; consequently the Bureau of Science has given instruction in the preservation of native fruits and vegetables since April, 1925. Many prominent women in Manila attend the classes and they advise that they are practicing at home what they learned in the classes and that their grocery bills for canned goods have decreased since they have been practicing this new home industry. Sensing the great need for Philippine women to engage in home food preservation and knowing from experience the willingness on the part of these women to learn this industry, the Bureau of Science aims to popularize it throughout the Archipelago by means of lectures and practical demonstrations. The Government is behind the Bureau in this important work and any woman who wishes to know how it helps in this campaign, need only ask any governor, or representative, or senator.

By preserving native foods at home Philippine women would be doing a valuable service to their country; for should food preservation be practiced throughout the Islands the benefits that could be expected to accrue to the country would be manifold. A few are here mentioned.

1. It would stimulate agricultural development by causing more fruit trees to be planted.
2. It would give profitable work to idle hands.
3. It would improve the general health of the people by supplying a more varied and balanced diet.
4. It would prevent the waste of perishable foods by preserving them for future use.
5. It would help mothers in building up happier and better homes.
6. It would stabilize prices by equalizing the food supply.
7. It would enable the people to save the surplus products of one locality to sell to other localities where there is a shortage.
8. It would advertise the Philippines to other nations through the export of delicious tropical fruits.

9. It would tend to lessen the amount of imported food products which could easily be produced here.

10. It would help to make of the Philippines an economically independent country, instead of as now a country dependent upon other countries for a large part of its food supplies.

Food preservation began with the caveman and on its success depends mankind's ability to live a civilized life. Consequently, much thought and energy have been expended on this problem of food preservation, for it was soon learned through bitter experience that all food products which were not protected in some manner soon spoiled and decayed and returned again to the earth. Gradually the various ways possible to preserve food for edible purposes were worked out and now this knowledge is available to any one who will spend a little time and energy in study, for the subject is not complicated and really can be summed up in a few words. Water is the one great factor in the spoiling of food; therefore, to prevent this the water must either be taken away (the food dried, in other words), or else other means must be found to keep it from acting on the food in connection with the minute plant and animal life, everywhere present, that causes decay.

The world should be grateful to Nicholas Appert, a Frenchman of great ability and much training, who experimented and obtained success in food preservation by sterilization. He began experimenting in the year 1795, but was not successful until 1840. For this valuable work the French government awarded him a prize of 12,000 francs and gave him the title of discoverer of the art of canning.

PRINCIPAL METHODS USED IN FOOD PRESERVATION

A. Drying.—Drying is probably the first known method of preserving foods. It is simple, easy to perform, needs but little apparatus, and is applicable to many kinds of food. The principle involved in this method is the reduction of the water content of the food to a sufficient degree to prevent it from spoiling. After the moisture is removed, the food product is stored in such a way as to prevent it from absorbing moisture.

GENERAL METHODS USED IN DRYING

1. By sunshine, where the food is usually sliced, spread on a suitable container, a piece of mat or a tray being commonly used, and exposed to the sun to dry.

2. By artificial heat, where the material is dried by exposure to the action of hot air in an oven or in a specially constructed drier.

3. By air blast, where the food is dried by means of a fan driven by electricity, alcohol, or kerosene. This method requires about twenty-four hours for drying fruits, and a few hours for drying some vegetables that are not very rich in water content, such as string beans, peas, etc. Foods that are fan-dried should be heated in the oven a few minutes before storing.

Certain apparatus is required in food dehydration, where the food is dried by heated air. This is the best method of all.

B. Smoking.—This is a method which is usually used in preserving fish and meat. The food is first salted and then exposed to smoke produced by slowly burning saw dust or shavings of one of the many Philippine woods. The preserving chemicals present in the smoke prevent the growth of bacteria, aided by the drying which generally goes on at the same time.

C. Salting.—This method is one of the first known and practiced here. It is applicable to both vegetable and animal foods. When the salt comes in contact with the product the water content is drawn out and the salt enters the tissues, thus making the food firmer and preventing decay. The two most important methods of salting used are—

1. Dry salting, where the food is first mixed with salt to remove a large amount of the moisture and then dried.
2. Brining, where the food is packed in a container and covered with a solution of salt (brine) until used.

D. Pickling. (*In condiments*).—Pickling is usually applicable to foods that do not have much taste in themselves. Pickles are usually preserved with vinegar and condiments. These act as preservatives and at the same time give delicious flavor and odor to the food.

There are two methods of pickling in general use, namely:

1. Simple pickling, where the food is prepared, salted, and preserved with vinegar and other condiments. These ingredients both preserve the food and give it a better taste. Sugar is added to the vinegar when sweet-sour pickle is desired.
2. Fermented pickling is accomplished by curing the food with salt and allowing the lactic acid fermentation to develop for a few weeks.

The following spices are used in these methods: vinegar, black and white pepper, cinnamon, cloves, allspice, nutmeg, yellow mustard, celery seed, caraway, coriander, cayenne pepper, turmeric, and bay leaves.

E. Sterilization.—Foods spoil, ferment, or decay because of the growth of living microscopic organisms called germs. These are the molds, yeasts, and bacteria, all plants of a very low order. In canning, sterilization (that is, killing or destroying all germs) is most essential and is accomplished by heating. Molds and yeasts are destroyed at, and even below, the temperature of boiling water; but bacteria, due to their spores, are not completely killed by boiling water unless the food containing them is boiled for a long time, say five hours, or else about an hour for three successive days. Since air, water, and food contain germs, complete sterilization is very necessary to assure the preservation of foods.

The few commonly used methods of sterilization are:

1. By cooking the food directly over the fire, then placing it in sterile jars and sealing them hermetically.
2. By boiling water, where the jars containing the food are placed in a boiler, the jars covered with water and the water boiled for a certain length of time, depending on the kind of food to be sterilized.
3. By the use of the air oven, where the food is packed in jars and placed in an oven of carefully regulated temperature. The oven can be heated either by gas or by electricity.
4. By the use of a steam oven. The bottom and sides of the oven are so arranged that the filled jars, covered but not tightly sealed, placed in it to be sterilized come in contact with steam only.
5. By the use of a pressure cooker. The steam pressure cooker consists of a vessel provided with a pressure gauge and safety valve, allowing a pressure of from 5 to 30 pounds per square inch, to be placed on the sealed jars to be sterilized. This not only completes the process quickly but also cooks thoroughly in a short time vegetables and other foods that, under ordinary conditions, require long boiling.

F. Sugar.—The preservation of food with sugar is also common. Sirup in sufficiently concentrated form acts as a preservative and food products can therefore be preserved either in dry sugar or in sirup which is made by dissolving the sugar in water. In both cases where excess sweetness is to be avoided sterilization in addition is necessary. When fruits are preserved with much sugar they are known as jelly, marmalade, jam, candy, butter preserve, etc., according to their form and the method of preparation used.

In as much as food preservation by canning (that is, by sterilization) is comparatively new in the Philippines and is of the greatest importance to the average housewife, the greater portion of this pamphlet is dedicated to the details and methods of preparation of local food products applicable to this process.

It is intended that this pamphlet will be revised and enlarged again to include all methods and new food products as they become available. Coöperation, criticism, and suggestion of housewives from all parts of the Islands are welcome and will be carefully considered.

METHODS OF CANNING

There are several methods used in canning, namely:

Cold-pack method, where the food is packed in jars, covered with hot sirup or any other suitable liquid, the jars partially sealed and sterilized completely, and after sterilization sealed completely.

Hot-pack method, where the raw material is cooked in an open vessel, and immediately packed in sterile jars and sealed completely.

Fractional intermittent method, where the food is packed in jars, and the jars sealed and sterilized for one hour for three successive days.

Vacuum-seal method, where vegetables and fruits are washed, blanched, and cold-dipped, then cooked, packed, and sealed in especially made vacuum seal jars.

The most popular of the methods mentioned is the cold-pack, because it is simple and is very convenient. Next in popularity is the hot-pack method; since the packing is done before the material has undergone any cooking or sterilization, it is easy to pack the food so it will appear attractive. In the hot-pack method packing is done while the food is hot and in such a hurried way that but little attention can be given to its arrangement. Authorities on canning agree that fruits and some vegetables retain their flavor better by the cold-pack method.

Utensils and materials.—For home canning ordinary kitchenware is necessary. This consists of paring knives, long-handled spoons, wash pans, a boiler, glass jars, a wide-mouthed funnel, plenty of clean towels, sugar, a supply of cold water, a large table, and a cooking stove. The use of iron and tin utensils should be avoided in canning, for these are easily attacked by the acid in the fruits and thus give a bad color and a metallic taste to the product. For canning on a small commercial scale a hand sealing machine is recommended.

Jars.—The best glass jars are the most economical, for good jars do not break easily and, if properly handled, last indefinitely. There are many kinds of jars in the market. They come in various sizes; namely, gallon jars; quart jars; half-quart, or pint, jars; and half-pint jars. The gallon jars are hardly ever used, because it is difficult to sterilize them. The half-pint jars are also hardly ever used.

The *double seal jar* is a wide-mouthed jar with a glass top that is held in place by a simple wire spring. Failure in canning when these jars are used is mostly due to defective rubber rings. These jars are preferable over others because the tops, being of glass, can be used repeatedly and they last as long as the jars, although much care is needed in handling to prevent them from breaking; the tops of other jars, usually of metal, are easily attacked by the acid in the fruit.

The *mason jar,* usually narrow-mouthed, has a screw top of metal usually lined with enamel or glass, and this makes a hermetic seal when screwed down on the rubber ring. These jars are about the cheapest on the market although, in the long run, they may be very expensive for the tops, being of zinc, easily corrode when they come in contact with the acid fruits and hence need to be changed frequently.

The removable clamp and glass top is a glass cover which is pressed down on the rubber ring by the wire clamp as soon as the jar is removed from the boiler or oven. When the jar cools the clamp is removed and the top stays in place because of the vacuum in the jar. Loosening of the top on standing indicates that the contents of the jar are fermenting.

The jars with metal lacquered tops do not require rubber rings. Around the edge of the top runs a groove filled with a compound like rubber which, by the heat of the jar during canning, melts and forms a seal, as it hardens on cooling. The clamp is placed while the jar is hot, and removed when cold. A new top is required every time one of these jars is used, as the only way to remove the top is by puncturing it.

Tin cans are employed for canning on a commercial scale, but for home canning glass jars are mostly used for the reason that, although they cost much more than tin, they are cheaper in the end, for they can be used repeatedly for many years, while the tin cans can be used only once. Another advantage which the glass jars have over the tin cans is that the product inside is seen through the glass, while that in the tin can is not; also, the glass jar is not exposed to the danger of being attacked by the acid present in the fruit, while tin is easily attacked so that the product inside sometimes turns black, and if sufficient tin is dissolved in the liquor tin poisoning may result from eating the product. The latter disadvantage is partially overcome by using lacquered cans, the lining of which protects the tin from being attacked by the acid in the fruit.

Cans.—If tin cans are used in canning a sealing machine or soldering is essential. At present the hand can sealer is being used in American homes as well as in canning on a small commercial scale. This simple machine is very easy to operate and no solder is required. Under favorable conditions about a thousand cans can be sealed by such a machine in a day. The machine costs about 60 pesos and is therefore very inexpensive when one considers the benefit that can be derived from it.

Sterilizer.—Any one of several vessels may be used as a sterilizer (the vessel that holds the filled jars or cans during the sterilization period); namely, a steam-pressure cooker, a steam sterilizer, a simple boiler, or an air oven (gas or electric).

The steam-pressure cooker is provided with a pressure gauge and safety valve and carries from 5 to 30 pounds of steam pressure. There are several types in the market; some are made of aluminum, some of iron. The steam-pressure cooker is very handy to have for home or community canning, for sterilization in this cooker is very rapid.

The steam sterilizer consists of an oven provided with steam, or a double-lined oven. The space between the walls is heated by the steam which is generated when the water in the oven boils.

A simple boiler may be a home-made utensil or a boiler with a tight-fitting cover and large and deep enough to hold 2.5 centimeters of water above the jars or cans. A wash boiler is popularly used. The boiler should be provided with a wire or wooden rack to hold the jars, so they will not come in contact with the bottom of the boiler, as too high heat will cause breakage. The rack should be held far enough from the bottom of the boiler to permit circulation of water underneath the jars. The rack should be constructed in such a way that the jars will be held in place during the sterilization period, to prevent them from bumping against each other, and should be provided with handles so as to avoid the use of bottle lifters. Bottle lifters are long iron tongs especially devised for lifting bottles from boilers.

An electric oven is an air oven heated by electricity. This is hardly ever used, for it is very expensive. The air oven heated by gas is also seldom used, for in canning dry heat is not so satisfactory as is moist heat.

Other utensils.—The paring knives should be sharp. About three enamel-lined or porcelain wash basins should be provided. Silver knives, silver spoons, and long-handled spoons are also necessary. Plenty of clean towels are indispensable. A large, clean table is very essential. Funnels, both narrow- and wide-mouthed, are necessary—the narrow-mouthed for filtering sirup and the other for transferring the cooked fruits from the open kettle to the jars when the hot-pack method is used.

Plenty of sugar, sirup, salt, or brine should be ready for use.

PREPARATION FOR CANNING

Utensils.—Before starting to can one must be sure that all materials necessary are ready and clean.

Jars.—The jars should be tested by running the finger around the edge of the neck and if any sharp projections are noted they should be filed smooth, for if left sharp they may cut the rubber rings and hence not make a perfect seal. The tops should be tested, and those that rock should not be used. The jars should be examined for cracks, for a jar with even a very small crack will break when hot sirup is poured into it. They should be thoroughly cleaned and, if canning is to be done by the hot-pack method, should be completely sterilized before they are used.

Failure in canning is sometimes due to defective rubber rings. Rubber rings should be used only once. Good rubber rings should stand the following tests: They should stand a few hours boiling; they should not crease when bent double and pinched; they should return to the original size when stretched; that is, they should be elastic, not stiff.

Fruits.—The fruits should first be graded; that is, sorted as to size, color, and ripeness. This helps to insure a better pack, as the canned goods will have a uniform flavor. Overripe fruits should not be used, and all fruits should be washed thoroughly after they have been graded.

Blanching.—Some fruits and many vegetables are easily peeled after blanching. To blanch, dip the fruit or vegetable in boiling water for a few minutes, then immerse it in cold water. This process makes the skin loose and easy to remove. The period required for blanching depends on the kind of fruit. Peaches, tomatoes, and some others are easily peeled after blanching. Blanching also causes the food to shrink, and thus a larger quantity may be packed in the container. In some cases, as in asparagus and others, blanching removes the bitter taste. The most practical way of blanching fruits or vegetables is to put them in a bag or basket, dip in boiling water for the time required, and then transfer to a pan of cold water or, better still, put under running cold water. In this way accidents will be avoided.

Peeling.—The knife with which the fruit is to be peeled should be clean and sharp; after peeling it should be dipped immediately in cold water or brine to prevent discoloration.

Sirup.—Fruits are usually canned with sirup, its strength depending upon the acidity of the fruit. Sweet fruits require a thin sirup, and acid fruits a thick sirup. Sirup is made by boiling the water, adding the sugar and stirring until dissolved, then boiling and filtering. Thin, medium, thick, and very thick sirups are used in canning; these sirups will hereinafter be referred to by number, namely, 1, 2, 3, and 4. The quantities of sugar and water to make the sirups are as follows:

No. 1, thin:
  1 cup sugar + 4 cups water.
No. 2, medium:
  1 cup sugar + 2 cups water.
No. 3, thick:
  1 cup sugar + 1 cup water.
No. 4, very thick:
  2 cups sugar + 1 cup water.

Brine.—Brine is made by dissolving salt in water, and then boiling and filtering the solution. From 2 to 5 per cent brine is used in canning vegetables. Brine is also used in preparing some fruits for canning which turn brown immediately after peeling.

STEPS IN CANNING

1. Prepare the fruit; that is, sort, wash, blanch, peel, and slice (if necessary).
2. Pack in jars or cans.
3. Add hot sirup.
4. Put tops in place and half seal.
5. Sterilize; see Table 1 for sterilization period and calculate from the time the water begins to boil.
6. Remove from sterilizer.
7. Seal tightly.
8. Invert jars and cool.
9. Clean outside of jars and affix label.
10. Store in a cool, dark, dry place.

TABLE 1.—*Time table for sterilizing quart jars.*

[For pint jars or for 1 to 1.5 pound cans, deduct 5 minutes.]

Fruits	Boiling water.	Steam oven.	Pressure cooker (5 to 10 pounds).
	Min.	*Min.*	*Min.*
Balimbing, whole	30	25	12
Balimbing, halved	25	20	10
Breadfruit, or rimas	35	30	15
Chico, whole	30	25	12
Chico, halved	25	20	10
Galo	35	30	15
Guava, or bayabas	30	25	12
Guayabano	35	30	15
Hevi	30	25	12
Huani, sliced	25	20	10
Kaki (Pagatpat)	30	25	12
Karanda or carissa	25	20	10
Katuri	30	25	12
Ketembilla	25	20	10
Lanzon	25	20	10
Mabolo	25	20	10
Makopa	35	30	15
Mango, whole	35	30	15
Mango, sliced	25	20	10
Mangosteen	25	20	10
Nanka (Jackfruit)	30	25	12
Paniala	30	25	12
Papaya	25	20	10
Piña, or pineapple	40	35	17
Santol, whole	35	30	15
Santol, quartered	30	25	12
Siniguelas	35	30	15
Sinkamas	30	25	12

If the fruits are too large to be put in jars or cans, slice or cut them into smaller pieces. Then pack carefully up to the neck of the jar or, if cans are used, to about 6 centimeters of the top. If jars are used, adjust the rubber rings, then pour hot sirup until all the interstices are filled and add more sirup until the jar is full. The jars are then half sealed; that is, in case of screw tops, the tops are screwed loosely, and in case of double-seal jars, they are half sealed, sterilized in the sterilizer, and then taken out. The jars are then tightly sealed and inverted to insure sterilization of the tops, cooled, cleaned, and labeled with the name of the fruit. The jars are stored in a cool, dry, dark place. Light sometimes decolorizes the fruits. If the jars are to be sterilized in a wash boiler they should be placed on the rack and enough water be put in the boiler to cover the jars 2.5 centimeters from the top of the jars. The boiler is then tightly covered or, better still, a piece of cloth is spread on top of the boiler before the cover is adjusted, so as to prevent the escape of steam. If cans are used the can is filled with the fruit and enough boiling sirup added to fill it full; the can is then sealed hermetically with a can sealer, and sterilized. When cans are used the sterilizer commonly used is the pressure cooker, although boiling water or a steam oven is very satisfactory when the products to be canned are fruits.

DETAILED INSTRUCTIONS FOR CANNING SPECIAL FRUITS

Mango.—Use the ripe fruit only, not overripe; remove the seed with a sharp knife; remove the pulp from the skin with a silver spoon, trying as much as possible to make the pieces uniform in size; pack in jars or cans; pour hot sirup No. 2 to fill the container; run a knife under the edge of the container to remove air bubbles; jars should be half sealed, and cans completely; sterilize. Remove jars from sterilizer and immediately seal tightly; invert jars and cool. Do not put jars in a draft, for this will break them. When cool, wipe the outside of jar with a wet cloth, then with a dry one; label, and store in a dry, cool, dark place.

If mangoes are to be canned whole, peel and pack in jars; pour in hot sirup No. 2 and sterilize (consult Table 1 for sterilization). Whole mangoes require a longer time for sterilization than sliced. Follow directions given above.

If the mangoes are very sweet use sirup made in the proportion of 1 cup sugar to 3 cups water.

Lanzon.—Local names, bulahan, buan, kaliboñgan, lansones.

Peel the fruits with the fingers and separate the segments; drop in weak brine (about 5 per cent) to prevent them from turning brown; remove the seed from each segment and wash thoroughly with cold water until all salt is removed. Pack in jars or cans and add sirup No. 2; sterilize (see Table 1). Follow the rest of the instructions given under Mango.

Canned lanzones turn light brown on standing. This discoloration can be partly overcome by using colored jars or by storing the jars in a dark place.

Piña, or pineapple.—Blanch 4 minutes; remove peel about 3 centimeters thick; remove eyes with the point of a sharp knife; cut into squares or into any form desired, taking care that the slices are uniform; wash thoroughly in cold water. Pack in jars or cans and add sirup No. 3; sterilize (see Table 1). For further directions, see Mango.

Santol.—Boil 3 minutes, peel as thin as possible with a sharp knife. If the santols are to be canned whole, prick with a pin and soak in rice washing overnight; then wash with water to remove all the rice washing.[1] Boil in plenty of water for about 2 minutes. Drain and squeeze each fruit to remove most of the water. Pack in colored jars, add hot sirup No. 3, half seal and sterilize. For the rest of directions, see Mango.

If the santols are to be canned without the seeds, blanch 3 minutes; peel; cut into quarters; remove seeds; soak in rice washing overnight; wash off rice washing with water; boil 1 minute in water; drain and pack in colored jars; fill jars with hot sirup No. 3 and sterilize. Remove the jars from the sterilizer and seal completely.

Colored jars are preferred over white ones because the santol becomes brown on standing if kept in white jars.

Guava.—Blanch the ripe fruit for 2 minutes; peel thin; if to be canned whole, prick with pin; drop the peeled, pricked fruit into a pan of cold water. Drain and pack in jars and add hot sirup No. 3; sterilize (see Table 1). For further directions, see Mango.

If the guava is to be canned sliced, blanch for 2 minutes; peel; cut into halves; remove seeds; pack in jars and add sirup No. 3; sterilize (see Table 1). For further directions, see Mango.

Papaya.—Local names, kapaya, papias, tapayas.

Peel the ripe papaya and wash in cold water; cut open and remove the seeds with a spoon; cut into small pieces as desired; pack in jars and add sirup No. 2; sterilize (see Table 1). For further directions, see Mango.

Chico.—Sort the fruits and can only the ripe ones. Blanch 2 minutes; peel and cut into halves; remove seeds; boil in water for 4 minutes; drain and wash with cool water. Pack in jars and add sirup No. 2; sterilize (see Table 1). For further directions, see Mango.

If the chicos are to be canned whole, blanch; peel; boil for 5 minutes; wash in water and drain. Pack in jars and add sirup No. 2; sterilize (see Table 1).

Nanka, or jackfruit.—Open the fruit and separate the segments; remove the seed from each segment. Pack the segments in jars and add sirup No. 2; sterilize (see Table 1). For further directions, see Mango.

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[1] Usually called "sabao sinaing" or "hugas bigas" in Tagalog.

Mangosteen.—Sort the fruits and use only those that are soft enough to be opened by hand; open the fruit and separate the snow white pulp. Pack in jars and add sirup No. 3; sterilize (see Table 1). For further directions, see Mango.

Guayabano.—Pare the mature but not too ripe guayabano, cut into squares, and remove the seeds. Pack in jars and add sirup No. 3; sterilize (see Table 1). For further directions, see Mango.

Breadfruit.—Blanch 5 minutes; peel the ripe breadfruit with a knife and cut it into small pieces, as desired; wash; drain; boil slowly with sirup No. 3 in an open kettle for about 15 minutes; drain the sirup into another vessel and pack the boiled pieces in the jars. Add sirup No. 3 and sterilize (see Table 1). For further directions, see Mango.

Mabolo.—Sort and blanch 2 minutes; peel; cut into quarters; remove seeds. Pack in jars and add sirup No. 3; sterilize (see Table 1). Continue as with Mango.

Cashew (Kasoy).—Use ripe fruit only. Take out the bean-shaped seed, using the fingers. Wash the fruit thoroughly; blanch 3 minutes; pack in jars; add hot sirup No. 3 and sterilize (see Table 1). For further directions, see Mango.

Siniguelas.—Select the mature but not ripe fruits; remove the stems; wash; blanch 2 minutes; pack in jars and add hot sirup No. 3; sterilize (see Table 1). For further directions, see Mango.

Makopa.—Sort the fruits and use the ripe ones only. Wash thoroughly with water and blanch 2 minutes. Pack in jars and add hot sirup No. 3; sterilize (see Table 1). For further directions, see Mango.

Kamanchile.—Take the fruit from the pod and remove the seeds. Pack in jars; add sirup No. 3 and sterilize (see Table 1). For further directions, see Mango.

Galó.—Boil for about 3 minutes. Drain; pack in jars; add sirup No. 3 and sterilize (see Table 1). For further directions, see Mango.

Pagatpat.—Sort the fruits; blanch 2 minutes and peel. Cut into halves if desired and pack in jars. Add sirup No. 2 and sterilize (see Table 1). For the rest of directions, see Mango.

Balimbing.—Prick with a pin and boil for a few minutes with plenty of water in a copper kettle. Drain the water and next boil the fruit with sirup No. 2 in a copper kettle until the fruit becomes green again. Then pack the fruit in jars and add sirup No. 3. Sterilize (See Table 1). For further directions, see Mango.

Huani.—Since huani is very similar to mango, follow the directions under Mango.

Tubo. Coconut embryo.—Sort according to size and use the medium-sized ones only (about as large as guava). Pack in jars and add sirup No. 3. Sterilize (see Table 1). For further directions, see Mango.

Hevi.[2]—Use the ripe fruits only. Peel with a knife; cut into desired slices; pack in jars and add sirup No. 3. Sterilize (see Table 1). For further directions, see Mango.

Ketembilla.[2]—Sort and use ripe fruits only. Blanch one minute; peel and pack in jars. Add sirup No. 4 and sterilize (see Table 1). For further directions, see Mango.

Carissa.[2]—Use ripe fruits. Wash and pack in jars. Add sirup No. 3 and sterilize (see Table 1). For further directions, see Mango.

Katuri.[2]—Use ripe fruit only. Blanch 2 minutes; peel and cut into quarters. Boil in plenty of water for about 5 minutes; then boil in sirup No. 3 for 10 minutes. Allow it to stand overnight in the same sirup. Drain and pack in jars. Add sirup No. 4 and sterilize (see Table 1). For further directions, see Mango.

Malpi.[2]—Blanch the ripe fruit; pack in jars and add sirup No. 3. Sterilize (see Table 1). For further directions, see mango.

Saba banana.—Use the ripe fruits. Boil for about 10 minutes. Peel and pack in jars; add sirup No. 3 and sterilize (see Table 1). For further directions, see Mango.

Sweet potato.—Scrub with a brush and boil in a small amount of water until done. Peel and cut into pieces of uniform size. Pack in jars and add sirup No. 3. Sterilize (see Table 1). For further directions, see Mango.

Gabe.—Follow directions under Sweet Potato.

Ube.—Follow directions under Sweet Potato.

GENERAL INSTRUCTIONS FOR MAKING JAMS

Peel the ripe fruit and mash until it is reduced to very fine pieces or pulp; add from 50 to 100 per cent of its weight of sugar and cook until thick. Transfer to sterilized jars while boiling hot and seal tightly.

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[2] These are foreign fruits now growing at the Lamao Experiment Station of the Bureau of Agriculture.

Mango jam.—Peel the ripe fruit; remove the seed; mash and to ten cups of the pulp, add 6 cups of sugar. Cook until thick and while boiling hot transfer to well sterilized jars and seal jars tightly.

Papaya jam.—Peel the ripe fruit and wash; open and remove all seeds; mash. To 10 cups of the pulp add 7½ cups of sugar. Boil until thick. A few slices of lemon added while cooking will improve the flavor. Transfer while hot to well-sterilized jars and seal hermetically.

Pineapple jam.—Peel and remove eyes. Cut into pieces and boil until soft with a very small amount of water. Pass through a food chopper and to 10 cups of the pulp add 7½ cups of sugar. Cook until thick and while hot transfer to well-sterilized jars. Seal tightly.

Lanzon jam.—Peel and separate the segments. Remove the seeds and cut into fine pieces. To 1 cup of the pulp add 3/4 cup of sugar. Cook until thick. Transfer while hot to well-sterilized jars and seal hermetically.

Guanabano jam.—Peel the ripe fruit and remove the seeds. Pass through a meat grinder. To 1 part of the pulp add 1 part of sugar and boil until thick. Pack while hot in well-sterilized jars and seal tightly.

Jackfruit jam.—Open the fruit and separate the segments; remove the seed from each segment and pass the segments through a food chopper. To one cup of the pulp add 3/4 cup of sugar and boil until thick. Pack in well-sterilized jars and seal tightly.

Papaya-Orange jam.—Peel the papaya; remove the seeds and pass through a food chopper. Boil the pulp 5 minutes. To each cup of boiled papaya add 1 cup of mandarin[3] juice, 1 teaspoon of grated peel, and 3/4 cup of sugar. Boil until thick and clear. Pack while hot in well-sterilized jars and seal tightly.

Papaya-Guanabano jam.—Prepare the papaya pulp as for papaya jam; prepare the guanabano pulp as for guanabano jam. To each cup of papaya pulp add 1 cup of guanabano pulp and 1½ cups of sugar. Boil until thick; pack while hot in well-sterilized jars and seal tightly.

Papaya-Pineapple jam.—Reduce the ripe papaya to a fine pulp and to each cup add one cup of pineapple that has been cut into very fine pieces. Add 1½ cups of sugar and boil until thick. Pack in well-sterilized jars and seal tightly.

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[3] Naranjita

Tamarind jam.—Select the ripe tamarind. Peel and soak overnight in plenty of water. Drain and put the soaked tamarind in a piece of coarse sinamay and squeeze until all the pulp has come out. To each cup of tamarind add 1 cup of sugar and boil until thick. Pack in well-sterilized jars and seal tightly.

Papaya-Tamarind jam.—To each cup of papaya pulp add ½ cup of tamarind pulp and 1½ cups of sugar. Boil until thick; pack in well-sterilized jars and seal tightly.

Mango-Orange jam.—To 1 cup of mango pulp add ½ cup of orange juice and 1 cup of sugar and boil until thick. Pack in well-sterilized jars and seal tightly.

Tubo-Mango jam.—Pass the tubo through a food chopper and boil for 5 minutes. To each cup of tubo add ¼ cup of mango and 1 cup of sugar and cook until thick. Pack in well-sterilized jars and seal tightly.

Tubo-Guanabano jam.—Pass the tubo through a food chopper and boil for 5 minutes. To each cupful add ½ cup of guanabano pulp and 1¼ cups of sugar and boil until thick. Pack while hot in well-sterilized jars and seal tightly.

Tubo-Jackfruit jam.—Follow directions above, using ½ cup of jackfruit instead of guanabano, and add 1 cup of sugar instead of 1¼.

Tubo-Orange jam.—Pass the tubo through a food chopper and prepare the orange as follows: Peel orange and separate the segments. Remove the seeds and white covering of each segment. Use the remaining pulp. To each cup of tubo add 1 cup of orange pulp and 1½ cups of sugar. Boil until thick; pack while hot in well-sterilized jars and seal tightly.

Chico jam.—Peel the fruit and cut into quarters. Remove the seeds and mash the fruit until it is reduced to fine pieces. To 1 cup of chico pulp add ¾ cup of sugar and boil until thick. Pack while hot in well-sterilized jars and seal tightly. Small amounts of nutmeg, allspice, and cinnamon will improve the flavor.

Guava jam.—Use the ripe fruits only. Peel and mash the fruit. To 1 cup of the pulp add 1 cup of sugar. Boil until thick; pack in well-sterilized jars and seal tightly.

Rimas jam.—Use the ripe fruit. Wash and boil the whole fruit until soft. Peel and mash. To each cup of the pulp add ¾ cup of sugar and boil until thick. Pack in well-sterilized jars and seal tightly.

Rimas-Orange jam.—Wash the ripe fruit and boil until thick; mash and to 1 cupful add ½ cup orange juice, 1 teaspoon grated orange rind, and 1¼ cups sugar. Boil until thick; pack in well-sterilized jars and seal tightly.

Saba jam.—Boil the ripe banana until soft. Peel and pass through a food chopper. To each cup of the pulp add ¾ cup of sugar and boil until thick. Pack in well-sterilized jars and seal tightly.

Guanabano-Orange jam.—Peel the ripe guanabano and remove the seeds. Pass through a food chopper. Peel the orange and separate into segments. Remove seeds and white covering of each segment and use the pulp only. To each cup of guanabano pulp add 1 cup of orange pulp, 1 tablespoon of grated orange peel, and 2 cups of sugar. Boil until thick; pack in well-sterilized jars and seal tightly.

Jackfruit-Orange jam.—Open the fruit and separate the segments. Remove seed from each segment and pass the segments through a food chopper. To each cup of the pulp add 1 cup of orange, 1 tablespoon of grated orange peel, and 1¼ cups of sugar. Boil until thick; pack in well-sterilized jars and seal tightly.

GENERAL INSTRUCTIONS FOR MAKING JELLIES

Jelly is a fruit product prepared by expressing the juice from the boiled fruit, boiling with sugar, and cooking to such consistency that gelatinization takes place on cooling.

A good jelly must gelatinize on cooling and retain the shape of the container when removed. It must be soft but must not flow, and soft enough to quiver on shaking. It must be clear and transparent and should retain the flavor of the fruit.

Jelly can be made only from fruits rich in pectin and acid, although it is also made from other fruits containing less pectin or acid, by adding commercial pectin, or pectin prepared at home, or the juice of other fruits rich in acid and pectin such as apple, santol, paniala, or bignay. The presence of acid is just as essential as pectin in jelly making, as it has been found that sweet fruits rich in pectin will not "jell" without the addition of other juices that are rich in acid. Sweet guava, peach, and quince are examples.

Pectin is a substance belonging to the carbohydrate group. It is usually called vegetable jelly. It is found in many fruits, especially in mature or just ripe fruits. It is extracted as variously colored translucent substances which dissolve in hot water and become viscous on cooling.

Some of the American fruits that are rich in pectin are sour apples, crab apples, under-ripe grapes, quinces, cranberries, raspberries, blackberries, blueberries, wild cherries, and green gooseberries.

The Philippine fruits that are rich in pectin so far found are guava, santol, bignay, duhat, green tamarind, ketembilla, lipoti, carissa, and paniala.

If commercial pectin is unobtainable pectin can be prepared at home by the following method: [4]

> Grate the yellow all off the orange; cut off the remaining white peeling, and run it through the meat grinder. Weigh it, and to each 1.1 kilograms add 3 cups of cold water and 3 tablespoonfuls of lemon juice. Mix thoroughly and set aside for 4 hours. Then boil it for 10 minutes. When it is cooled, add another 3 cups of cold water, bring it again to the boiling point, and then let it stand overnight. The next morning, boil a third time, for 5 minutes. Cool, and strain through a jelly bag. Use one cupful of this orange pectin to each cupful of the fruit juice, and add only 1 cup of sugar for this amount.

Preparation of powdered pectin.[5]—Make a jelly from apples or equal weights of lemons and oranges and concentrate. Cool, and add the concentrated juice slowly with stirring to twice its volume of 95 per cent ethyl (grain) alcohol. Separate the alcohol from the pectin by draining through a muslin cloth and pressing. Dry at room temperature on a screen. Dissolve the dried pectin in a small amount (about 150 cubic centimeters) of water and strain through a cloth. Add the pectin solution to twice its volume of ethyl alcohol and separate the precipitate by straining through muslin. Dry at a temperature of 120° to 130° F. Grind in a mortar to a powder. Store in a corked bottle.

Apple Pectin.

1 pound apples.
Juice of 1 lemon.
4 pints of water.

Boil for one-half to three-fourths of an hour, place the juice in a heavy flannel bag, and allow the juice to drain without pressure. After bottling and sterilizing for 15 minutes in water it can be kept until needed for jelly making.

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[4] From Successful Home Canning and Jelly Making Extension Service of the College of Agriculture, University of Wisconsin, Madison, p. 22.

[5] Lab. Manual of Fruit and Vegetable Products, Crues and Christie, p. 56.

Preparations for Jelly Making.—It is the safest rule to test the fruit for pectin content before proceeding to jelly making because the amount of sugar that is to be added has much to do with the pectin content. More sugar may be allowed to fruit juices rich in pectin than to those not so rich.

How to Test for Pectin Content.—From the juice of the fruit that has previously been boiled and filtered, draw off about 10 cubic centimeters, or about one teaspoonful, and transfer to a test tube (or a glass, if a test tube is not available) and to it add an equal amount of 95 per cent alcohol. A precipitate will appear, the amount of which indicates the pectin content of the fruit juice. A small amount of precipitate indicates that the juice is poor in pectin. The presence of a few large pieces of gelatinous precipitate indicates that the juice is rich in pectin. The absence of precipitate indicates the absence of pectin.

The simplest test for acidity is to taste the juice; a surer method, however, is to titrate an aliquot portion of the juice with a standard solution of alkali.

In addition to the utensils mentioned for canning fruits the following are necessary: jelly glasses, paraffin, and muslin bags.

Fresh fruits should be used and they should have been picked not longer than 24 hours before cooking. Just ripe or slightly underripe fruits are best, for at this stage they are rich in acid and pectin.

STEPS IN JELLY MAKING

1. Extract the pectin. Since pectin is soluble in hot water, cut the fruit into small pieces, add a small amount of water, and boil until soft.

2. Express the juice. If preparing a large quantity, express the boiled fruit and place the juice in a pan. Let it stand overnight. Filter the next morning. If making only a small amount of jelly put the boiled fruit in the muslin bag and hang it where it will drip overnight.

3. Test the juice for pectin and acid, using the test already described.

4. Add to the clear juice clean sugar, previously warmed in an oven, in the following proportion:

(*a*) If the juice is rich in pectin add 1 cupful to 1 cup of sugar.

(*b*) If the juice is moderately rich in pectin add 1 cupful to $\frac{3}{4}$ cup of sugar.

(*c*) If the juice is poor in pectin add 1 cupful to a half-cup of sugar.

(*d*) If the juice is still poorer in pectin, boil and concentrate until the test for pectin content is satisfactorily positive.

5. Boil the mixed sugar and juice, skimming from time to time, until the "jelling" point is reached. If the juice is overboiled the pectin is broken down to pectic and other acids and therefore loses its power of gelatinizing.

(*a*) Dip a spoon into the pan containing the juice and sugar. Hold it up and let the juice drip. When the juice drops in a mass from the side of the spoon, or if it drops in flakes, the "jelling" point is reached.

(*b*) Drop the juice in a saucer containing cold water; when the drops do not change and melt, the "jelling" point is reached.

(*c*) Dip a thermometer in the boiling juice. When the jelly boils at 212° F., the "jelling" point is reached.

6. Filter the boiling juice through a few thicknesses of gauze.

7. Fill the jelly glasses or jars with the filtered juice and let them stand to cool.

8. Melt paraffin in a pan. Run the point of a knife around the inner edge of the glass, loosening the jelly about 6 millimeters from the top; then pour over it hot paraffin to cover.

9. Place the tin cover over the jelly glass and label the glass.

10. Store in a cool, dry, and dark place. A second and a third extraction of juice may be made by reboiling the pulp with a small quantity of water and concentrating the juice before sugar is added.

Santol jelly.—Wash and blanch recently gathered, just ripe, or underripe santol; cut into small pieces; put in a pan and add just enough water to cover the product; boil until soft; squeeze the juice out and allow it to settle; filter juice through a muslin bag; test for pectin content; measure the juice and add recently heated sugar in the proportion of 1 to 1; boil, skim, and determine "jelling" point; when this point is reached, transfer to jelly glasses and let cool. Pour melted paraffin over it and place the tin cover; label and store.

Guava jelly.—Wash and blanch mature but not ripe guavas; cut into small pieces and boil in a small quantity of water until soft; transfer to a muslin bag and let it drip; test for pectin and add the right amount of sugar (1 to 1); boil, skim, and determine "jelling" point; filter, and fill jelly glasses. When cool pour melted paraffin and place the tin cover; label and store.

Ripe guavas are usually rich in pectin but low in acid. If low in acid, add some juice of an acid fruit or some citric or tartaric acid (3 per cent).

Bignay jelly.—Stem and wash just ripe bignay berries and follow general directions. The proportion of sugar to juice is 1 to 1.

Paniala jelly.—Stem and wash; blanch 1 minute, cut into small pieces, and follow general directions. The proportion of sugar to juice is 1 to 1.

Guava-Santol jelly.—Follow the general directions. Use equal parts of sugar and juice.

Tamarind jelly.—Peel the ripe tamarind and soak in plenty of cold water overnight; drain and pulp; remove the seeds; put the pulp in a pan with a small quantity of water; add some apples, cut into small pieces (three apples to 1 kilogram of pulp); boil for about 30 minutes; strain and to the strained juice add an equal amount of sugar; boil and follow general directions.

Mabolo jelly.—Boil together 4 parts of mabolo and 1 part of green tamarind in a very small amount of water. Express the juice and measure. To each cup of the juice add $\frac{3}{4}$ cup of sugar and follow general directions.

Papaya jelly.—Follow instructions under Mabolo jelly, using ripe papaya instead of mabolo.

Chico jelly.—Follow instructions under Mabolo jelly, using ripe chicos instead of mabolo.

Duhat jelly.—Boil the ripe fruit with a small amount of water and express the juice. To each cup of the juice add 1 tablespoon of lemon juice. To each cup of the mixed juice add 1 cup of sugar and boil until the jelling point is reached. Follow general directions for jelly making.

Makopa jelly.—Boil the washed makopa with a small amount of water. Transfer to cheesecloth and squeeze out the juice. To each cup of juice add 2 tablespoons of lemon juice and 1 cup of sugar. Boil the mixture until the jelling point is reached. Follow general directions.

GENERAL INSTRUCTIONS FOR MAKING MARMALADES

Marmalade is jelly in which slices of fruit or peelings are suspended. The general directions for jelly making already given will also apply in making marmalade, excepting that slices or pulp, and sometimes the peelings of the fruit, are included. Seeds should be discarded.

Orange marmalade (slightly bitter).—Peel the oranges and slice the peelings into very thin pieces of about 2.5 to 3.75 centimeters in length; boil in a kettle in plenty of water until tender; drain off the water; pulp the peeled orange and pass through a sieve; add the peelings and 1 kilogram of sugar to 1 of pulp and peelings; boil to the right consistency, as in jelly.

Orange marmalade (*sweet*).—Follow the preceding instructions, but soak the sliced peelings in strong brine solution (about 20 to 30 per cent) overnight and wash thoroughly next morning until the salt has been washed off. Soaking the peel in brine removes the bitter taste.

To be sure that all the bitterness will be eliminated, take a very sharp knife and peel off as thin as possible the outer part of the rind of the orange. Then separate the peel from the pulp and cut into thin slices, about 1¼ inches long. Boil with water for about 3 minutes. Drain and boil again in water; drain and squeeze out the water.

Mandarin marmalade.—Cut as thin as possible the outer part of the rind. Cut the fruit into quarters. Peel off each quarter and cut the peelings into very thin slices, about 1 to 1¼ inches long. Boil 3 minutes in water; change the water and drain and boil again, and squeeze out the water. Separate the segments and take out the seeds and the white covering from each segment. Use the pulp only. To one cup of the pulp add ½ cup of sugar and boil until somewhat thick. Then add the rind and boil again until thick. Pack in well-sterilized jars and seal tightly.

Mango marmalade.—Two parts mango pulp + 1 part apple pulp + 3 parts sugar.

Nanka marmalade.—Two parts nanka pulp + 1 part apple pulp + 3 parts sugar.

Bignay marmalade.—Three parts bignay pulp + 3 parts sugar.

Santol marmalade.—Three parts sliced santol + 3 parts sugar.

Guava marmalade.—Two parts guava pulp + 1 part bignay pulp + 3 parts sugar.

Tomato marmalade.—Blanch ripe tomatoes and peel; remove the seeds, and to the pulp add some lemon pulp; make the combined pulp into marmalade, using equal parts of pulp and sugar.

GENERAL INSTRUCTIONS FOR MAKING FRUIT BUTTERS

Fruit butters are fruit products made by boiling the fruit pulp, straining[6] it and boiling down, with or without sugar, to a thick and homogeneous consistency. Sometimes juice instead of sugar is added. Some use spices as flavoring.

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[6] The straining can be done through a piece of sinamay, coarse cloth made from abaca fiber, thin cheesecloth, or a fine sieve.

Use ripe fruits only. Blanch, peel, and cut into small pieces; boil with a small quantity of water until soft; mash and pass through a screen or sieve; add 0.5 to 0.75 kilogram of sugar to 1 of pulp. If juice is to be used instead of sugar add 1.4 liters of juice to 0.5 kilogram of pulp.

Add spices, such as cinnamon, cloves, allspice, etc., to the pulp, if desired; one-third of a teaspoon of spice to 0.5 kilogram of pulp is sufficient.

Boil the pulp and sugar or juice down to a very thick consistency. While boiling hot, transfer to sterile jars or glasses and seal immediately. If glasses are used, paraffin may be used, as in jelly.

Fruit butter differs from jam in that it is finer and is concentrated to a thicker consistency.

Guava butter.—Blanch and cut ripe guavas into small pieces; boil until soft; pass through a sieve or sinamay; add 0.75 kilogram of sugar to 1 of strained pulp and boil down to a thick consistency.

Mango butter.—Peel the ripe mango and remove the seed. Reduce the meat to fine pieces and pass through a piece of sinamay. To each cup of strained pulp add ½ cup of sugar and boil down until thick. Pack while hot in well-sterilized jars and seal tightly.

Nanka butter.—Proceed as with mango.

Duhat butter.—Same as mango, but use 0.75 kilogram of sugar to 1 of pulp.

Chico butter.—Same as mango, but use allspice, nutmeg, and cinnamon to flavor.

Papaya-Tamarind butter.—Peel the ripe papaya; remove all seeds and mash. Pass the pulp through a piece of sinamay. Soak the ripe, peeled tamarind overnight. Drain and pass the pulp through a piece of sinamay. To 1 cup of strained papaya pulp add ¼ cup of tamarind pulp and 1¼ cups of sugar. Boil until thick; pack while hot in well-sterilized jars and seal tightly.

Santol butter.—Boil the fruit until it becomes soft. Peel and cut into small pieces. Pass through a piece of sinamay. To 1 cup of the strained santol pulp add 1 cup of sugar and boil until thick. Pack in well-sterilized jars and seal tightly. Small amounts of nutmeg, allspice, and cinnamon will improve the flavor.

Guanabano butter.—Use the ripe guanabano. Peel and remove the seeds. Pass through a food chopper and then through a sieve or sinamay. To one cup of the strained pulp add 1 cup of sugar and boil until thick. Pack in well-sterilized jars and seal tightly.

Papaya-Guanabano butter.—To 1 cup of strained papaya pulp add ½ cup of strained guanabano pulp and 1¼ cups of sugar. Boil until thick; pack in well-sterilized jars and seal tightly.

Papaya-Orange butter.—Follow directions under Papaya-Guanabano butter, but use ½ cup of orange juice instead of ½ cup of strained guanabano pulp.

GENERAL INSTRUCTIONS FOR MAKING FRUIT PASTES

Fruit paste is made in the same manner as fruit butter, except that it is more concentrated and is dried. The finished product resembles candy.

Mango paste.—Pare the ripe mangoes and remove the seed from each. Mash and strain through a piece of sinamay. To each cup of strained mango pulp add ¾ cup of sugar and boil until very, very thick (until it reaches a boiling point of 222° F.); spread in a buttered pan and dry in the sun. Cool and cut into pieces, as desired. Dip in powdered sugar and transfer to sterilized jars or cans and seal tightly.

Nanka, ates, guanabano, papaya, pineapple, duhat, lanzon, and chico can be made into paste by following the directions under Mango paste.

Santol paste.—Boil the fruit until it becomes very soft. Peel and reduce the santol to very fine pieces. Pass through a piece of sinamay. To each cup of strained santol pulp add 1 cup of sugar and boil until very thick. For further directions, see Mango paste.

Tamarind paste.—Peel the ripe fruits and soak overnight in plenty of water. Drain and pass the pulp through a piece of sinamay. To each cup of strained tamarind pulp add 1 cup of sugar and boil until very thick. For further directions, see Mango paste.

Guava paste.—Prepare the guavas as for guava butter. Boil further until very, very thick. For further directions, see Mango paste.

Ube paste.—Wash the ube and boil until very soft. Mash until fine. To each cup of the pulp add 1½ cups of milk and stir until well mixed. Pass through a strainer and boil down until it becomes thick. Then add sugar, little by little, to suit the taste. Boil until very thick. For further directions, see Mango paste.

Papaya-Orange paste.—Peel the fruit and remove all seeds. Mash and pass through a sieve or a piece of sinamay. To each cup of papaya add ½ cup of orange juice and boil until thick. Then add 1 cup of sugar and boil down until very thick. For further directions, see Mango paste.

PRESERVES

Fruit preserves are prepared from fruits and sugar. If well made they keep their form and plumpness and are somewhat crisp rather than soft.

In making preserves one should take great care to use thin sirup at the beginning. If thick sirup is used it will quickly draw the juice out of the fruit and consequently the fruit will shrink and become tough; for after the juice has gone out of the fruit the fruit will be coated with the thick sirup instead of the sirup entering the tissues of the fruit.

Kondol preserve.—Peel the fruit and open; remove all seeds and cut into slices. Soak overnight in lime water, made by dissolving 1 tablespoon of lime in 1 quart of water. Then soak in plenty of cold water for about 2 hours and drain. Boil plenty of water and drop in this the drained sliced kondol; boil for about 10 minutes and drain. To 2 cups of sugar add 1 cup of water and boil. Add to this the sliced kondol and cook until it is soft and tender. Let it stand in the same sirup overnight and then pack in jars and sterilize. Seal completely after sterilization.

Watermelon Rind preserve.—Follow instructions under Kondol preserve.

Rimas preserve.—Wash the mature but not ripe fruit. Peel and cut into thin slices. Cook with sirup made by boiling 2 cups of sugar and 1 cup of water. Let stand overnight. Cook again the next morning for about 10 minutes. Cool and pack in jars and sterilize for ½ hour. Seal tightly after sterilization.

Santol preserve.—Boil the fruit for about 3 minutes. Peel thin and cut into quarters. Remove the seeds. Cook in sirup made by boiling 2 parts of sugar and 1 part of water. Boil until the sirup becomes thick.

Green Papaya preserve.—Use green papaya. Peel and wash. Open and remove all seeds; cut into desired pieces. Soak in lime overnight and follow directions under Kondol preserve.

A few slices of lemon added while cooking will improve the flavor.

Camias preserve.—Use strictly fresh camias. Prick with a pin and slightly press the fruit by rolling a round roller, about 1.9 centimeters in diameter, over it to get rid of the very acid juice; rinse in cold water and boil in plenty of water, using a copper kettle. Squeeze out most of the water. To 2 parts of sugar add 1 part of water and boil in a copper kettle. To this, add the camias and boil for about 15 minutes, or until the fruit becomes green. Let stand overnight and cook again until thick. Cool; pack in jars and sterilize 25 minutes. Then seal the jars tightly.

A copper kettle is used to keep the color of the fruit green.

Lime or Dayap preserve.—Use fresh and immature limes only. With the aid of a sharp knife make narrow cuts about 2 to 2.5 millimeters apart, running spirally around the fruit. Remove the pulp from the inside without altering the shape of the fruit. Boil in a copper kettle containing water and some lime juice until the green color is fixed. Soak overnight in another container in cold water. Then boil once more in water and drain. Make sirup consisting of 1 cup of sugar to 1 cup of water and boil. To this sirup add the lime and boil until thick.

Nipa preserve.—Cut the nipa fruit open and remove the white flesh inside. Use the soft fruits only. Boil 1 cup of sugar and 1 cup of water. To this add the nipa fruit and boil until thick. A few anise seeds added while cooking will give it a better flavor.

Suha Peel preserve.—Use immature suha with a smooth peel. Peel very thin the outer portion of the suha with a sharp knife. Cut lengthwise into from 6 to 10 pieces. Remove the pulp and use the thick peeling only. Soak in concentrated brine or salt solution until it becomes very soft. (This takes a few minutes only.) Then squeeze or work it with the same brine for about 10 minutes. Then wash away all the salt with plenty of water. Squeeze or work it well with cold water until the peel is no longer bitter to the taste. Boil in a copper kettle with plenty of water until tender. Then wash with cold water and squeeze out all the water. Drop in sirup made by boiling 2 parts of sugar to 1 part of water and boil until tender. Cool; pack in jars and sterilize for 30 minutes. Seal jars tightly after sterilization.

Pineapple preserve.—Peel the ripe pineapple and remove the eyes. Slice as desired; place in a container alternate layers of sugar and fruit, using 1 part of sugar to 1 part of the fruit, and let stand overnight. Then drain off the sirup and boil for 10 minutes. Add the fruit and continue boiling 15 minutes. Pack in jars and sterilize 25 minutes.

Bignay preserve.—Use ripe bignay. Make a sirup, using 2 parts of sugar to 1 part of water. Add the fruit to the sirup and boil 10 minutes. Let stand overnight and cook again until thick. Pack in well-sterilized jars and sterilize 20 minutes. Seal the jars tightly after sterilization.

GENERAL INSTRUCTIONS FOR CANNING VEGETABLES

With the exception of some minor details, the principles of fruit canning hold good for vegetables. Like fruits, vegetables are sorted, cleaned, blanched, packed, and sterilized. Sirup is generally used in canning fruits; brine takes its place for vegetables.

It is safer for a vegetable canner to use well or spring water in making the brine. If such water is unobtainable tap water may be used, if filtered or boiled and allowed to settle, in order to remove the lime and iron impurities. The salt used should be free from chlorides and sulphates of lime, because these will cause the vegetables to become tough. The iron present in tap water, if not removed, will cause discoloration.

As vegetables are usually low in acid they constitute very suitable living quarters for spore-forming bacteria. Therefore, it is of great advantage, in sterilizing them, to use a pressure cooker instead of a steam oven or boiling water.

If vegetables are not strictly fresh, soak them in cold water to restore their crispness. Sort, blanch, and immediately soak in cold water. Cut off undesirable portions, and then cut the remaining portion into desired pieces for canning. Pack in cans or jars; add salt and boiling water or brine; sterilize. If jars are used, seal completely. Cool in an inverted position. Label and store.

Tomatoes, or camatis.—Sort and use ripe tomatoes only; blanch to loosen the skin; pack in jars or cans and half seal; add 1 teaspoon of salt to the quart jar; sterilize 30 minutes in boiling water or steam oven, or 15 minutes in pressure cooker of 5 to 10 pounds; seal completely; cool in an inverted position; store.

Tomatoes may be canned with the juice. If water is used instead of juice the product may be deemed adulterated.

Some use a half teaspoon salt and a half teaspoon sugar instead of salt alone.

Patani.—Known as bakuen, can-á, bialay, buni, buringi, butingi, haba, habichuela, kikilang, kopani, kutakut, caliding, palpalai, parda, perkoles, pinda.

Remove the beans from the pod; blanch and peel off the coating of the bean if desired. Pack in jars or cans and add boiling brine of 1.5 per cent strength. Half seal and sterilize 2 hours in boiling water or a steam oven, or 50 minutes in a pressure cooker of 10 to 15 pounds. Completely seal after sterilization and cool in an inverted position. Label and store in a cool, dry, and dark place. The use of poisonous patani beans should be avoided.

Apalia.—Known as amargoso, palia, kabiring, papit, paria, pulia, saligun.

Sort and wash; blanch the tender ones and cut open lengthwise; remove the seeds and soft portions where the seeds are embedded; cut crosswise into pieces of desired size, taking care to make them uniform. Pack in jars and add boiling 2 per cent brine; half seal and sterilize (see Patani); completely seal after sterilization and cool in an inverted position. Label and store in a cool, dark, dry place.

Patola.—Known as sikua and timon-anban.

Sort and wash; blanch 2 minutes. Pare with a knife and cut into suitable pieces. Pack in jars or cans and add boiling 1.5 per cent brine; half seal and sterilize (see Patani); completely seal after sterilization and cool. Label and store in a cool, dry, and dark place.

Batao.—Known as apikak, baglan, bulai, itab, parda, paradaatap, sibachi.

Sort and use tender pods only; wash in cold water. String the two ends and cut into pieces if desired; blanch for 2 minutes; cool. Pack in jars or cans; fill with boiling 2 per cent brine; sterilize 2.5 hours in boiling water or steam oven, or 55 minutes in pressure cooker of 10 to 15 pounds; completely seal and cool. Label and store.

Sitao.—Follow directions under Batao, cutting the pods into lengths of about 3.8 centimeters.

Cowpea, or kibat.—Known as balatong, batong, karakala, hamtak, otong, sitao.

Follow directions under Batao.

Seguidilla.—Known as amali, batong-baimbing, bulugian, cigarillas, buligon, beyed, kalamismis, kamaluson, palag, palam, parupagulung, karibang, sererella.

Follow directions under Batao.

Upo.—Known as baguang, buliañgin, kalubay, sikay, tabungan, tabu-o.

Sort; use tender ones only; wash and remove soft portions and seeds from center; cut into desired pieces. Pack in jars and add boiling 1.5 per cent brine; sterilize 45 minutes in hot water or steam oven; completely seal after sterilization and label; store.

Pumpkin or calabaza (as a vegetable).—Sort and use tender ones only; wash, blanch, and peel; cut open and remove seeds; cut into small pieces and pack in jars or cans; add boiling 1.5 per cent brine. Sterilize 2 hours in boiling water or steam oven, or 45 minutes in pressure cooker, 10 to 15 pounds.

Calabaza (for pie filler).—Use mature calabaza; wash, blanch 5 minutes, and peel; cut open and remove the seeds; cut into pieces and boil in as little water as possible until soft; pulp and fill sterile jars or cans. Sterilize 2 hours in boiling water or steam oven, or 45 minutes in pressure cooker, 10 to 15 pounds, and completely seal. Label and store. Cook with sugar, if desired.

Habichuelas.—Use tender, fresh pods only. String and cut into pieces 1½ to 2 inches long. Blanch in soda solution (made by boiling 1 teaspoonful of soda with 1 gallon of water) for five minutes. Then plunge into a salt solution (made by dissolving 1 tablespoonful of salt to 1 quart of water) for about a half minute. This is done to fix the green color of the vegetable. Drain and pack in jars. Add 1 teaspoon of salt to the quart jar and half that amount to the pint jar and fill with boiling water. Half seal and sterilize 3 hours. Seal tightly after sterilization.

Pea pods (Chicharro).—Follow directions under Habichuelas.

Peas (Guisantes).—Use fresh and tender peas only. Remove the peas from the pod and blanch 3 minutes in soda solution. Then plunge them into the cold salt solution. Drain and pack in jars. Add 1 teaspoon salt to quart jars and fill them with boiling water. Half seal and sterilize 3 hours in boiling water. Completely seal after sterilization.

SOME PICKLES

Bamboo Shoot pickle.

4 cups of sliced bamboo shoot.
2 sections of garlic.
2 sweet red peppers.
1 hot red pepper.
8 small native onions.
A small piece of ginger.

Take the fresh bamboo shoot and cut into desired pieces. Soak overnight in strong salt solution. This keeps the bamboo shoot white. Boil in plenty of hot water until tender. Drain and pack in jars with the above ingredients which, with the exception of the hot red pepper and onions, must also have been sliced into small pieces. Arrange the ingredients in the jars in such a way as to make the pickle attractive. Make a solution of 4 parts of vinegar and 1 of sugar and while boiling hot pour in the bottle to cover the product. Seal the jar tightly.

Papaya pickle.

3 cups of grated green papaya.
1 small cucumber.
2 sweet red peppers.
1 hot red pepper.
1 carrot.
1 ampaleya.

Peel the green papaya and grate it. Soak overnight in strong salt solution. Peel the cucumber and carrot; slice; cut the ampaleya into pieces. Soak overnight in strong salt solution with a pinch of alum to make it stay crisp. Wash with water the next morning and drain. Pack in jars, using all the ingredients mentioned above and arranging them in an attractive manner. Pour a hot solution of 4 parts of vinegar and 1 of sugar. Seal tightly.

Half-ripe Papaya pickle.

4 cups of half-ripe papaya.
⅔ cup of sugar.
1 small onion.
½ cup vinegar.
½ large ginger root.
1 section of garlic.
1 green pepper.

Pare onion and garlic; slice thin. Remove seeds from pepper and slice. Boil the vinegar, sugar, ginger, and garlic for 20 minutes. Then add pepper and boil for 5 minutes longer. Add papaya and onion and boil until clear. Pack in jars and seal tightly.

Sinkamas pickle.

6 cups sliced sinkamas.
2 cups grated green papaya.
3 sections of garlic.
1 small piece of ginger.
3 sweet green peppers.
2 sweet red peppers.
2 hot red peppers.

Peel the sinkamas and cut into desired pieces. Soak overnight in strong salt solution with a pinch of alum. Soak the grated green papaya overnight in strong salt solution. Wash the sinkamas and papaya and drain. Slice into small pieces the garlic, sweet green peppers, sweet red peppers, and the ginger, and pack them in jars with the cured sinkamas and grated green papaya. Pour over each jarful a hot solution of sugar and vinegar, made by boiling 3 parts of vinegar to 1 part of sugar. Seal tightly.

Sour pickles consisting of the same ingredients can be made by using vinegar alone.

Sweet Green Tomato pickle.—Cut the green tomatoes into thin slices and add $\frac{1}{4}$ of the amount of salt. Let stand about 2 hours. Drain out the liquid. Make a solution of 4 parts of vinegar and 2 parts of brown sugar and boil. To this add the tomato and cook until soft and thick. Add small amounts of nutmeg, allspice, cloves, and cinnamon and cook to a thick consistency. Pack in well-sterilized jars and half seal. Sterilize 30 minutes and seal completely.

CHUTNEY

Chutney is a sweet, hot pickle very popular in India. It is usually served with cold meats, sausage, and curries.

Mango chutney.

8 cups of sliced mature but not ripe mangoes.
3 small boxes of raisins.
1 large piece of ginger root.
1 hot pepper.
3 segments of garlic.
1 tablespoonful of salt.
8 cups brown sugar.
3 cups vinegar.

Boil the vinegar, salt and brown sugar and strain through a piece of thick cloth. Boil again for about 15 minutes. Add the sliced mango and continue boiling until soft. Add the raisins, then the sliced garlic and hot pepper, and boil 5 minutes. Lastly, add the finely sliced ginger and boil until thick. Pack in well-sterilized jars and seal hermetically.

Hevi chutney.—Use mature but not ripe hevi. Slice into thin slices and follow directions under Mango chutney.